

A CASE OF FRACTURE AND DISLOCATION OF THE ASTRAGALUS.<sup>1</sup>

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A MAN about twenty-eight years of age, in a fit of drunken delirium, jumped from a third-story window, and was brought to Bellevue Hospital April 27. I saw him the next morning, about eighteen hours after the accident. There was a large bruise below the right patella, a row of abrasions along the left shin, and a small bruise below the left patella. The left foot and the lower half of the leg were swollen and discolored, the foot was at right angles to the leg, and was capable of some flexion and extension without deviation. A marked prominence was present at the inner side of the ankle, over which the skin was tightly drawn and was livid; it was at first supposed to be the internal malleolus, and the foot seemed to be carried bodily to the outer side, but on palpation the prominence was found to be behind and a little below the malleolus, and to have a curved border running backward and outward. Below this border could be felt a broad surface, that was curved backward and inward, and was flattened in a direction downward and inward; in front there was an abrupt depression. The scaphoid was in its normal location with regard to the malleolus, and no depression could be felt behind it in the situation of the head of the astragalus, although the swelling was such that the examination was not deemed very trustworthy. The peroneal tendons were displaced forward, so as to lie upon the outer surface of the external malleolus. The relations of the fifth metatarsal, cuboid and calcaneum appeared to be normal. The dorsalis pedis artery was beating, but the posterior tibial could not be felt. The diagnosis of fracture of the neck of the astragalus, with dislocation backward and inward rotation of the body, was made, and an attempt was made to reduce under ether, by flexing the knee and making downward traction upon the foot, and pressure outward and forward upon the projection behind the internal malleolus. This failing, an incision three inches long was at once made backward and downward from a point in front of the malleolus, its center corresponding to the most prominent part

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of the projection. The upper articular surface and the outer edge of the astragalus presented in the wound, and the body of the bone was found lying below and behind the malleolus, its broken neck being directed forward and inward, its upper articular surface looking inward and downward, its posterior border close to the tendo Achillis, and its inferior surface just behind and below the posterior border of the end of the tibia. A transverse fracture had taken place at the junction of the body and neck, and the body had been completely dislocated backward and inward, with rotation inward of about  $120^{\circ}$  about its antero-posterior axis, and of about  $45^{\circ}$  inward about its vertical axis. The tendons of the tibialis posticus and the flexor longus digitorum were torn from their sheaths and crossed the inner surface of the malleolus above the astragalus. The posterior tibial artery was pressed backward, and was separated from the tibia by the interposed posterior portion of the body of the astragalus. Exploration of the joint showed that the head of the astragalus was in place, and there was no injury to the tibia or fibula. The lower tibio-fibular joint was not injured. The fracture ran from the anterior border of the trochlea downward into the groove occupied by the interosseous ligament. The body was easily removed, as all its ligaments and connections had been ruptured, except a part of those attached to its posterior border. The wound and joint were thoroughly cleansed, the incision was loosely closed with two silk-worm gut sutures, a drainage-tube being inserted, the foot and lower part of the leg were enveloped in iodoform and bichloride gauze, and a plaster-of-Paris bandage was applied over all. On the following day the patient's alcoholic symptoms were much less marked, and his condition was good. On the third day a fenestrum was cut and the tube was removed; the wound was dry, the swelling had diminished, and everything looked favorable, but three days later he developed pneumonia, and died on the ninth day after the accident.

To this record of the case I beg leave to add a brief mention of the few similar cases that have been reported. They are those of Denonvilliers, Lejeune, Pichorel, MacCormac, Le Gros Clark, and Cheever. In the first two the dislocation was directly backward, in the others backward and inward, as in the present case. Of Denonvillier's case I have only the brief notes given by Malgaigne, viz., the body of the astragalus crossed the calcaneum at right angles, and its trochlea appeared through the skin below and behind the internal malleolus; he removed it, but the patient died. Of Lejeune's and

Pichorel's cases the quotations by Delorme ("Dict. de méd. et de chir. prat.," vol. xxvii, p. 643) and Poinot (Transl. of Hamilton's "Fractures and Dislocations") are even more brief; of the former it is only said that the dislocation was compound, of the latter that after two unsuccessful attempts at reduction, including division of the tendo Achillis, suppuration ensued and the limb was amputated. MacCormac's patient ("Trans. of the Path. Soc. of London," 1875, vol. xxvi, p. 174) was injured by the fall of a platform; the character of the injury was not recognized, and, after rest in bed for some weeks, he was able to walk well and to continue his occupation as a brick-layer. Two years later MacCormac removed the leg because of disease at the knee, and made a careful dissection of it. The foot was stiff, and was at a right angle with the leg without deviation. The astragalus had been broken at the neck, and the body had been so displaced and rotated that it lay behind and a little to the inner side of the tibia, its trochlear surface looking inward and backward, its posterior border being in contact with the tendo Achillis, and its broken surface looking downward and forward. The internal malleolus had been broken and had reunited, and the astragalus was connected with it by bony union. The tendons of the tibialis posticus and flexor longus digitorum were displaced inward and forward, lying on the inner surface of the malleolus; that of the flexor longus pollicis was separated from the tibia by the body of the astragalus, and lay upon the trochlear surface of the latter. No mention is made of flexion of the great toe, such as existed in Cheever's case, and in two others in which the unbroken astragalus was displaced backward and inward, but one of the accompanying figures shows the terminal phalanx flexed. MacCormac reports also a case treated in 1863 by Le Gros Clark, which he himself had an opportunity to examine twelve years later; he found the body of the astragalus identical with that of his own case, and supposed that there had also probably been fracture of the neck. The patient had full use of the limb, walking without lameness.

Cheever's patient (*Boston Med. and Surg. Jour.*, vol. xciii, 1875, p. 237), a man thirty-two years old, was injured by a fall of about twelve feet. There was a very marked, partly

rounded, partly sharp projection of bone between the inner malleolus and the heel, and a depression beneath the outer malleolus. The tendo Achillis was tense, and was shortened over the abnormal prominence of bone, which lay between the inner ankle and the heel. The heel was drawn up, and the mobility of the ankle joint was greatly diminished. The last joint of the great toe was strongly and immovably flexed at a right angle. After failing to reduce by traction under ether, he divided the tendo Achillis, then the tendons of the tibialis anticus and posticus, then that of the flexor communis digitorum, and finally the tendon of the flexor longus pollicis at the toe, but the dislocation still remained irreducible. The skin sloughed over the astragalus, but did not expose it, and the ulcer soon healed; in seven weeks the patient could freely move the foot, and in five months could walk with a cane. The divided tendons appeared to have united firmly.

The histories do not make clear the mode of production of the fracture and dislocation, but it seems probable that they occur while the foot is in dorsal flexion and by the agency of external violence, acting in the direction of the long axis of the leg along the sloping articular surface of the calcaneum, and forcing the tibia and calcaneum closer together, so that the posterior part of the astragalus is squeezed out from between them.

In my case, the bruises upon the front of the knees and legs indicate that the patient struck upon his feet with the ankles in dorsal flexion.